بسم الله الرحمن الرحيم

International University of Africa

Faculty of Pure and Applied Sciences

Study the Effect of X-Ray on

Bipolar Junction Transistor (**BJT**) **NPN 129**

By: Asia Ibrahim Arbab Abdalla

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Supervisor: Dr. Omer Mohammed Adam Adllan

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الآيـــــــــــــــــة

قال تعالى:

((اللَّهُ نُورُ السَّمَاوَاتِ وَالأَرْضِ مَثَلُ نُورِهِ كَمِشْكَاةٍ فِيهَا مِصْبَاحٌ الْمِصْبَاحُ فِي زُجَاجَةٍ الزُّجَاجَةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ زَيْتُونَةٍ لاَ شَرْقِيَّةٍ وَلاَ غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ نَارٌ نُورٌ عَلَى نُورٍ يَهْدِي اللَّهُ لِنُورِهِ مَنْ يَشَاءُ وَيَضْرِبُ اللَّهُ الأَمْثَالَ لِلنَّاسِ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ))(35)

صدق الله العظيم

سورة النور – الآية(35)

Dedication

To my lovely parents,

To my family's love patience, support and care were essential all the time to accomplish this project.

To my friends and my colleagues.

To my medical physics family.

I dedicate this work to you.

Acknowledgement

In the Name of Allah, the most Beneficent, the most Merciful. First Praise is to Allah, and peace and blessings upon the noblest Messengers, and his Prophet Mohammed and on his family and all his companions.

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Abstract

This project is aimed to study the effect of radiation (X-ray)on BJT transistor parameters characteristic (**129-NPN**) was exposed land us in technology as a radiation detector .When transistor (**129-NPN**) was exposed by (X-ray) for different time sequences and supply of certain voltage(35) kv and current (1)mA.It found that the value of collector current (I_c) and collector voltage (V_C),base Emitter voltage (V_{BE}) and collector Emitter voltage(V_{CE}) with the fixed of the value of base current(I_B). After exposing The following values are calculated (β_{DC}),Electrical conductivity(Z) and Electrical resistance (gm).And indicate of a reduction in the value of the complex Emitter current(I_E),collector current(I_C) and (β_{DC}) with different time of irradiation.

The importance of the project came from that (X-ray) radiation is hazardous therefore detected it, so the transistor in this project has been used to defect any irradiation doses and it can be used as a radiation detector.

Also in this project was recommended that to use different amount of radiation doses in appropriate conditions.

المستخلص

إن هذا البحث يهدف إلى دراسة تأثير الأشعة السينية على خصائص الترانزستور. (NPN(129) وما يحدث له من تغير من اجل استخدامها في التكنولوجيا ككاشف للأشعة السينـيـة .تم تسليط الأشعة سينية (X-RAY) بفرق جهد مقداره (35V) وبتيار (1mA) على الترانزستور الموصل في دائرة كهربية كمضخم للتيـار لفترات زمنية متتالية (5,10,15,20,25,30,35,40,45,50) عند ثبوت قيمة تيار القـاعدةI_B تم قيـاس جهد القـاعـدة ($_B$) ، جهـد الباعث المجمــــع (V_{CE}) وتيار المجمع .وأيضا تم حساب قيمة العامل (β_{DC}) وقيمة الموصلية الكهربية (gm) والمانعة الكهربية. (Z) لوحظ انخفاض إن هناك انخفاض في القيم المذكورة اعلاه مع أزمان مختلفة من التشعيع .

تأتي أهمية هذا الدراسة إن الأشعة السينية أشعة ضارة مالم يتم الكشف عنها لذلك تم استخدام الترانزستور في دائرة كمضخم للتيار ليتم بواسطته استشعار الإشعاع .

كذلك تم التوجيه في هذه الدراسة أن تؤخذ القراءات عن تطبيق جرعات مختلفة من الأشعة السينية وذلك عند توفر الظروف الملائمة.

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No	Abbreviations
1	**SI** silicon
2	**Ga** germanium
3	**n** electron
4	**p** hole
5	**P** phosphorus
6	**As** arsenic
7	**Sb** antimony
8	**In** indium
9	**Ga** gallium
10	**B** Boron
11	**dc** direct current
12	**BJT** Bipolar Junction Transistors.
13	**NPN** negative-positive-negative transistors.
14	**PNP** Positive-Negative-Positive transistors.
15	I_E Emitter current.
16	I_C collector current.
17	I_B base current.
18	V_{BE} dc voltage at base with respect to emitter.
19	V_{CB} dc voltage at collector with respect to base.
20	V_{CE} dc voltage at base with collector with respect to emitter.
21	V_{BB} forward biases the bas emitter junction when the based emitter junction is forward.
22	β_{DC} DC Beta.
23	α_{DC} DC Alpha.
24	R_B base – resistance.
25	R_E emitter– resistance.
26	I_C collector – current.

27	**V_{BE}** (base – emitter) voltage.
28	**T** temperature induced minority .
29	**I_{CBO}** carrier current.
30	**NA** Avogadro's number. **C** speed of light in vacuum.
31	**V_{BE}** (base – emitter) voltage.
32	**mp** Proton rest mass.
33	**mn** Neutron rest mass.
34	**u** Atomic mass unit.
35	**KV** kilo voltage.
36	**mA** mill amperage.
37	**mp** Proton rest mass.
38	***Z*** atomic number.
39	***E*** the energy.
40	***E*K** a kinetic energy.
41	***S*** is known as the incoherent scattering function.